UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 W. JACKSON BOULEVARD
CHICAGO, ILLINOIS 60604-3590

Reply to the Attention Of: SR-6J

January 23, 2008

Via E-mail and Mail

Dr. Rainer Domalski
Rutgers Organics Corporation
201 Struble Road
State College, PA 16801-7488

RE: Draft Interim Deliverable, Feasibility Study for Operable Unit 3
Nease Chemical Site, Salem, Ohio

Dear Rainer:

U.S. EPA and Ohio EPA (the Agencies) have reviewed the draft *Interim Deliverable, Feasibility Study for Operable Unit 3, Nease Chemical Company, Salem, Ohio,* dated November, 2007 (Interim FS). Overall, the information presented is clear and reflects the discussions between the Agencies and your team at the earlier FS scoping meetings.

The attached comments are provided to help generate an adequate FS and facilitate remedy selection. No written response is needed for these comments, but the Agencies expect that the comments will be fully considered in development of the draft FS. Also attached are: a table with the numerical biocriteria scores and attainment status generated by Ohio EPA for inclusion in the FS to supplement the figures; and an updated memo relating to long-term monitoring of MFLBC to replace Attachment F.

Please note that the attached comments do not fully address the floodplain soil mirex PRG based on cattle. Because of the uncertainties related to mirex bioaccumulation and uptake in cattle, U.S. EPA has been considering additional approaches that may help refine the PRG range for this pathway. We expect to send a technical memorandum within one week outlining this approach. As with the other PRGs, because of the uncertainties, the Agencies are hoping to have multiple lines of evidence to support decisions.

Please call either of us at the numbers listed below if you have any questions or require clarification. The Agencies would be happy to meet or confer if this would be productive in your preparation of the FS.

Sincerely,

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cc via email: S. Finn, Golder Associates, Inc.
A. Joslyn, Golder Associates, Inc.
T. Christman, Ohio EPA
M. Mankowski, U.S EPA
J. Chapman, U.S. EPA

Agency Comments on the Interim FS, Operable Unit 3
Nease Chemical Site, Salem, Ohio
Dated November, 2007

A. GENERAL COMMENTS

1. Floodplain soil mirex PRG based on direct contact: Golder appears to be proposing a human health direct-contact floodplain soil mirex preliminary remediation goal (PRG) of 12.13 mg/kg for Middle Fork Little Beaver Creek (MFLBC) based on an excess cancer risk of 10^{-5} in the 'Table of Contents' (3.b.i). The FS should contain a discussion of the range of possible risk-based PRGs that are protective of all receptors (both human and ecological) at the site. Note:

   1.1. It is unclear which receptor population the 12.13 mg/kg PRG is based on, and whether the PRG incorporates all direct-contact soil pathways, including the produce pathway. As a comparison, assuming a linear relationship between risks estimated in the Endangerment Assessment (EA) and the exposure point concentrations, the following PRGs were calculated (not taking into account the soil to cattle to humans pathway): 10.5 mg/kg: not including produce, at the10^{-5} risk goal; 9.4 mg/kg, including produce, at the 10^{-5} risk goal; 0.94 mg/kg, including produce, at the10^{-6} risk goal.

   1.2. The proposed PRG is within U.S. EPA's carcinogenic "risk range" and at Ohio EPA's Division of Emergency and Remedial Response (DERR) carcinogenic risk goal. However, the proposed PRG is based on a risk goal an order of magnitude less stringent than risk goals presented for other pathways (for example, human health direct-contact sediment). The Agencies recommend consistency in the risk goals applied for the different pathways and across the different receptor populations. Perhaps the FS should discuss goals represented by U.S. EPA's risk range (e.g., numbers from 0.94 to 94 mg/kg). Additionally, the human health PRGs proposed should be supported by sufficiently detailed calculations in the FS or attachments.

2. Floodplain soil mirex PRG based on cattle and Attachment D: The Agencies recognize the difficulty of generating a range of PRGs for floodplain soil based on mirex bioaccumulation and uptake in cattle, and the great uncertainties with any such PRGs. U.S. EPA's ecological risk assessor, Dr. James Chapman, has been working to develop an approach that considers potential bioaccumulation. This will be submitted separately.

   If the figure currently provided as Attachment D is included in the FS, sufficient text to explain the figure should be included. Also, please consider and discuss whether the linear regression of the beef data should be forced through the origin. Further, to facilitate review, the following human health risk-based values were calculated for cattle, assuming a linear relationship between risks estimated in the Endangerment Assessment (EA) and the exposure point concentrations:

MEDIUM	Mlrex values in fat (ug mirex/kg fat) BASED ON			
CATTLE	HQ of 1	CRG of 10^{-4}	CRG of 10^{-5}	CRG of10^{-6}
BEEF FAT	230	520	52	5.2
MILK FAT	170	510	51	5.1

HQ: Hazard Quotient
CRG: Carcinogenic Risk Goal

3. MFLBC sediment mirex PRG:

   3.1. Sediment mirex PRG based on direct contact: Please see comment 1 above related to representing a range of risk-based values. However, if the FS represents the human health floodplain PRG based on a 10^{-5} risk goal, the sediment should also be based on a 10^{-5} risk goal for consistency (e.g., goal of 97.3 mg/kg).

3.2. Sediment mirex PRG based on human fish consumption: Golder appears NOT to be proposing a human health fish consumption sediment mirex preliminary remediation goal (PRG) based on a comparison of some fish tissue goals and the ecological based PRG in the 'Table of Contents' (3.a.iii). Because of the uncertainties with predictions of fish tissue levels based on sediment values, the Agencies would like multiple lines of evidence discussed in the FS. In addition to the approach proposed in the interim deliverable, please consider the following analyses:

- Comparison of Existing Fish and Sediment Data: In an email dated 12/14/2006, Steve Finn sent some charts showing a regression of certain fish and sediment data. It might be useful to include these regressions, or to combine both fish species and produce one regression. Because the regressions appear to be of whole fish mirex results, the data will have to be adjusted to fillet data to make it relevant to human consumers. Alternatively, it might be worthwhile to see if a similar regression can be calculated with existing fillet and sediment data.

- Estimation of Baseline Sediment SWAC or Average: It might be worthwhile to calculate the current SWAC in the MFLBC sediments between the site and about RM 31. However, the ability to calculate this depends on adequate knowledge of the soft sediment distribution and agreement on how to project between sampling points. At the least, average concentrations for this stretch can be calculated. Once developed, the PRGs can be compared to existing conditions. Although the relationship between fish tissue levels and sediment levels may or may not be linear, a reduction in bioavailable sediment levels should produce a related reduction in fish levels and this should be discussed in the FS.

4. Mirex analytical uncertainties: Given the differences in analytical results for soil and fish data between Ohio EPA and ROC (Exygen analysis), please carefully consider how the ROC's 2005 data should be used in the FS. Refer to comments on the figures, below, on whether the ROC (Exygen) data for 2005 should be qualified or adjusted in any way. Please note that the use of unadjusted ROC 2005 data in any of the calculations discussed in comment 3.2 above may seriously misrepresent conditions. Also, since the 1999 fish and sediment data may have been generated using the same analytical protocol by Eygen, please consider whether the mirex levels were under-reported owing to analytical issues, and, if so, how to use this data in the FS.

B. SPECIFIC CLARIFICATIONS REQUESTED:

5. Section 1 – Nature and Extent of Contamination – Current Figures:

5.1. General Figure Notes: It would probably be useful in the FS to develop a page of general notes and comments, especially if the comments refer to multiple figures. This could leave the figures less cluttered, while still providing clarity on what is illustrated.

5.2. Figure 1: Please indicate somewhere (as a note or in the legend) that this figure does not include all sediment along the length of the river, as the coarse sediment study ended at River Mile (RM) 21.5, as indicated in Figure 3.

5.3. Figures 1 through 3: Are these figures based on both the remedial investigation (RI) data and the 2005 data, or only one of the two? Please clarify.

5.4. Figures 7 through 10: In addition to the figures, please also provide the table, attached, with the biocriteria scores and attainment status. This will facilitate comparison to the manner in which Ohio EPA normally provides the scores (for example, clarify that the WWH wading criteria for the MTwb for the Erie Ontario Plain ecoregion is 7.9, not ~8 or higher). See also the comments on Figures 7 and 9, below.

5.5. Figures 7 and 9:

- Ohio EPA normally plots the IBI and MI_{wb} data as an average of the two passes in the same field season, not as individual passes; the average[1] IBIs and MIwbs from each sampling location are compared to the biocriteria. Please average the IBI and MI_{wb} scores at each site sampled in June and September 1999. This would also help clarify, for example, that the IBI scores at RM 9.9/10.0 (48_{ns}) and 9.0 (45*).

- Please consider using another color, to help distinguish between the biocriteria scores in 1987 and 1985.

5.6. Figure 8: It appears that the 1999 data at RM 10.9/10.7 (36*) and 9.9/10.0 (42_{ns}) are missing in the figure. Please add.

5.7. Figure 10: How were the Qualitative Habitat Evaluation Index (QHEI) goals presented in this figure developed? Based on personal input from the Division of Surface Water technical personnel, generally, QHEIs greater than 60 can typically support warm water habitat (WWH) biology; QHEIs greater than 75 can typically support exceptional warm water habitat (EWH) biology. Note also that there are no regulations that a specific QHEI should be attained in a specific type of habitat, although general narrative ranges (excellent; good; fair; poor and very poor) can be assigned based on stream type (headwaters or larger streams). The Agency has also correlated individual QHEI subcomponents with biocriteria such as the IBI at ecoregion (relatively non-impacted) sites. From a remedial standpoint, it is critical not to assign a higher QHEI goal than can be attained in the stream. Please substantiate the QHEI goals presented or modify the figure appropriately.

5.8. Figures 11 through 14 – Sediment Data:

- Because of the uncertainties with the mirex analytical results discussed in comment 4 above, some consideration should be given to representing adjusted data on the figures, particularly the ROC 2005 data. If this is done, there should be a discussion in figure notes.

- It may not be necessary in the FS to represent the sediment sampling events on so many discreet figures. Discreet figures should be used if they add something to our understanding of the conceptual site model, the system, or fate and transport of mirex in the system. For example, if the FS will discuss time trends, relate the results to high energy flow events (as shown on figure 6), discuss downstream transport over time, etc., it may be useful to have separate figures. However, if the FS will emphasize the distribution of mirex in MFLBC sediment relative to the fish tissue results, it might be simpler to condense the figures. In either case, EPA would like the FS to include a figure similar to Figure 1 top from Attachment B showing all of the sediment mirex data by year (on the same scale that is being used for the other figures).

- EPA would like the FS to include a figure similar to Figure 2 top from Attachment B showing all of the TOC-normalized sediment mirex data by year (on the same scale that is being used for the other figures). It will also be important to discuss in the FS why TOC is important and the relevance to the remedies developed (and area targeted).

5.9. Figures 15 through 22 – Fish Data:

- Please clarify as a footnote, in the legend, or as a separate page that the 1987 U.S. EPA data have been excluded.

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[1] In this case, the biocriteria scores from the individual passes at a sample location do not appear to be significantly different. If there had been consistent or wide variation between the biocriteria scores from individual sampling passes, the Agency would attempt to ascertain the reasons for the differences, and show the individual passes as necessary.

- When looking at the figures, it is possible to (mistakenly) conclude that no mirex was detected in fish samples labeled 'ND', and so the bar on the X-axis refers to the detection limit(s). To avoid confusion, please clarify that all fish fillet data, including non-detects, are presented in the figures and that the bar associated with "ND" notation does not refer to the detection limit, but to actual detections (i.e., even at sampling locations with the "ND" notation, fish with mirex were detected, as for example at RM 0.7 in Figure 19; RM 4.4 and 1.89 in Figure 20; and RM 4.4 and 1.89 in Figure 23).

- Figure 21 – Please consider whether the ROC 2005 fish data should be superimposed by a correction factor (similar to that used in Attachment B, in Dr. James Chapman's March 2007 memo); this adjustment may alleviate questions on the 2005 data differences between ROC data (Figure 21) and Ohio EPA data (Figure 22). Alternatively, the 2005 ROC fish data could be omitted from the figures and the Ohio EPA data relied upon. In any case, this should be discussed in a note on the figure or in a separate page explaining the reason for the difference in the data.

- Given the relatively low levels found in 1999 ROC data (Figure 18), compared to historical and more recent data, please consider whether the mirex levels were under-reported owing to analytical issues. If this is believed to be the case, please address with figure notes.

- As with the sediment data, please consider whether the fish results are best illustrated on so many discreet figures or fewer consolidated figures. EPA would like the FS to include a figure similar to Figure 1 top from Attachment B showing all of the fish mirex data by year (on the same scale that is being used for the other figures).

5.10. Figure 23:

- Before this figure is presented, it might be useful to show just the bar graph representing fine grain sediment deposits because this illustrates sediments in the system in a different manner than figures 1 – 3.

- Please see comment 6.1 below on the benefits of including whole body fish data in this figure to show patterns of mirex deposition (or in a separate figure along with the sediment data, if difficult to plot in this figure).

- Please make conforming changes that reflect changes to other figures (e.g., refer to the comment, above, on the reliability of "ND" notations for the 2005 ROC data; any adjustments that might be made to the ROC 2005 sediment and/or fish data, etc.).

5.11. Figure 24: Please see comments above, on the use of a correction factor for ROC 2005 sediment data. Alternatively, would it be helpful to include the Ohio EPA 2005 sediment data?

5.12. Figure 25 (Floodplain soil mirex results):

- What is the basis for the EA RME notation (receptor population and pathways) of 1,310 ug/kg? Were all pathways including produce considered? What about cattle? Please clarify. Alternatively, it may be simpler to drop the dashed line and discuss the risks in the FS text.

- Should the results from the boy scout camp be included on this figure?

- Based on the data provided in the CD/ print out tables, it appears that mirex was detected at levels greater than 2.8 mg/kg in floodplain soil; see the table below. Were some outlier data inadvertently omitted? Please verify the data and revise.

PRIMARY KEY	MEDIUM	RM	DATE	Mirex (ppb)
139	FP soil	35.25	1991	6650
144	FP soil	35.25	1993	3740

393	FP soil	27.68	1993	4080
394	FP soil	34.96	1990	3040
398	FP soil	33.24	1990	4540

5.13. Figure 26: Should the mirex units along the Y-axis have the TOC normalized notation to clarify, even if it is in the legend?

5.14. Figures 27 to 33:

- How were the duplicate samples (0.0466 mg/kg at RM 17.5 and 3.01 mg/kg at RM 35.3) collected in the 2005 sampling effort treated? They do not appear in the figures, currently. The Agencies recommend that these results are added for transparency purposes, particularly since higher levels of mirex were detected in the duplicate(s) than higher than the primary sample(s).

- The tables of data inserted on the figures should be labeled "historical data" to avoid confusion.

- Figure 27: It would be helpful to label Feeder Creek and highlight the confluence with MFLBC for reviewers that are less familiar with the site.

5.15. Figure 34: Please plan to briefly discuss in the FS text whether the depth samples in Feeder Creek were taken from consolidated materials or from sediment that had built up behind the sediment barriers, if this is known.

6. Section 1 – Nature and Extent of Contamination – Information not in the Interim Deliverable: The Agencies expect that the FS will include standard sections of text and will be of the high quality that we have come to expect from Golder. However, we strongly recommend that certain information that was not included in the interim deliverable be included in the draft FS:

   6.1. MFLBC and extent of investigations: The Agencies strongly recommend that some figures be developed for the FS illustrating the scope of MFLBC that has been assessed as part of the RI/FS process. These could be similar to Figure 1 in Attachment A, but modified to show river miles. It might also be useful to show sampling locations on similar figures, so that when the bar graph figures show results, it is easy to compare to location within the system.

   6.2. Extent of soft sediment coverage: In addition to assessment of cumulative sediment volume, the FS should address the distribution of sediment types (particularly soft sediment) within the system. Is it possible to include figures that show the distribution of the soft sediment deposit areas? This is particularly important for the area from the site to about RM 31. Also, would it be possible in the text to describe the approximate percent of the creek bed that is covered by soft sediment?

   6.3. Whole body fish mirex data presentation: The Agencies recommend providing a figure or figures, similar to those provided in Figures 15 to 24, showing mirex levels in whole body fish, since whole body fish mirex (plus photomirex) concentrations will probably be the basis for any ecological risk-based cleanup goal in MFLBC sediment. This would also provide a pictorial representation of the difference in mirex concentrations between whole body and fish fillet data, at least for the 1990 data set, and show historic whole body data.

7. Section 2 – Preliminary Remedial Action Objectives: As in the case of the OU 2 FS, please clarify that the term "mitigate" refers to reduction in the specific media cited to site-specific risk goals.

8. Section 3 – Preliminary Remediation Goals: Please refer to the General Comments, above.

9. Section 4 – Remedial Technologies: The Agencies are in agreement with the technologies as proposed for the sediments and floodplain soils. However, in addition:

9.1. The FS will need to include technologies for disposal of removed materials.

9.2. Staging and transport of removed sediments and management of water from sediments are generally some of the most challenging aspects of sediment projects, so the FS needs to consider these concerns and the associated technologies in some detail (e.g., dewatering – how and where, water treatment and disposal, transport of sediment to the disposal site, etc.). These issues also tend to be of high concern to the local community, so it will be beneficial to assess in the FS how to minimize disruption to the public from these technologies.

9.3. Finally, for sediments, there is a category of response called backfilling. Backfilling is different than capping because it is not intended to be engineered to achieve isolation and erosion protection. It is intended to be used when it is anticipated that removal will achieve the goals, but where a thin layer of material (e.g., 3 -12 inches) may be an appropriate contingency if post-removal residuals prevent attainment of the remedial goals. Because we have not assessed in detail some of the conditions that may influence residuals in MFLBC, EPA strongly recommends that backfilling be included as a contingency for the sediment removal technologies.

10. Remedial Alternatives (Section 5):

10.1. Should we develop different names for the alternatives?

10.2. Note that a wide range of draft PRGs have been proposed for MFLBC sediment and floodplain soils (and some are still under development), and thus a range of areal extent affected and remedial costs are possible depending on the specific PRG value finally chosen. It is the Agencies' intent to work to narrow the PRGs so this issue can be addressed in the FS to more specifically understand the affected areas and narrow the range of costs.

10.3. At this stage of review it is difficult to tell the difference between "targeted removal/backfilling to meet PRG (SWAC)" and "remove sediment above PRG" for the MFLBC sediment options. Please clarify in the FS.

10.4. The Removal and Management Plan #1 calls for natural recovery of the creek sediments. The Agencies agree that it is appropriate to include a monitored natural recovery remedy for MFLBC in the FS. However, in evaluating alternatives, the FS should discuss the extreme resistance of mirex to biodegradation as evidenced by the continuing levels in creek sediment decades after the original releases and also that any decrease in mirex levels would most likely be the result of downstream translocation, which may ultimately increase the area requiring monitoring.

10.5. In general, the Agencies support the idea of a PDI for alternatives that require further characterization of areas for removal. This would allow a better definition of the sediments and floodplains that really need remediation.

- In regard to sediments, because a surface weighted average concentration (SWAC) is likely to be used for targeting removal actions, the PDI should be set up to compare SWAC in the sediments of concern. Please see comment 6.2 about the soft sediments. Historically the sampling has focused on soft sediment bodies (because of the greater likelihood of contamination), which may only cover a portion of the creek. Thus, the projections of the PRG range is based on biased sampling. In conducting the sediment PDI we will need to ensure that the same approach is incorporated.

- The Agencies would like flexibility during the PDI to discuss whether there should be a "do-not-exceed" mirex level for individual samples in sediment and floodplain soil.

- A critical component of the remediation will be the definition of the exposure units, to help demonstrate that the risk goal(s) have been achieved. The Agencies therefore expect a

discussion of how the sediment exposure units will be delineated in the FS, in the demonstration of meeting risk goals.

10.6. This Interim Deliverable Draft gives no indication as to what residual cover thickness would be required to safely isolate contaminated sediments and soils left in place. Please discuss in the FS. Also, if any of the creek sediments are to be covered, the Ohio EPA normally requires a cover system design that is resistant to erosion and does not significantly disrupt stream flow.

10.7. This Interim Deliverable Draft alludes to institutional controls on floodplain areas. This should be carefully considered—in particular, whether ROC can obtain use restrictions on land that it does not own. Likewise, there may be difficulties for access for O&M activities on land ROC does not own. The FS therefore should include a discussion, as necessary, of difficulties associated with achievement of long-term goals.

10.8. Figures 35 – 37:

- Figures 35 and 36 state that sediment in Feeder Creek would be "removed or covered" in these alternatives. Because of the need to manage surface water flow, it may be unrealistic to cover the contaminated sediment without some removal. This should be assessed carefully in the FS, keeping in mind the design requirements for a potential cover.

- The floodplain soil PRGs are still under development. Upon finalization, these figures (if included in the FS) may need to be revised to more specifically identify floodplain areas that exceed PRGs.

- The differences in remedial approach for the MFLBC sediments are not clear.

11. Remedial Alternatives (Section 5) and Retained Remedial Alternative (Section 6): This interim document implies that the FS will develop five alternatives and retain four alternative for detailed analysis. It may be preferable to spend significant effort on the preliminary screening (based on cost, effectiveness, and implementability) and then only develop a limited number of alternatives, all of which are carried into detailed screening. Also, the Agencies are not sure that we want to eliminate the potential for ICs on some or all of the three farm areas.

12. Attachments:

12.1. Attachment A: Please note that although Ohio EPA and U.S. EPA agree with the technical information provided in this attachment, the power to issue or retract contact advisories is an Ohio Department of Health function. As such, the contact advisory will remain in place until ODH formally rescinds it.

12.2. Attachment C: The version of the advisory development document in Attachment C is obsolete, per DSW. Please use the updated version (most currently, November 2006) available on Ohio EPA's web site.

12.3. Attachment D: See the general comments on U.S. EPA's attempts to develop a range of PRGs based on cattle uptake of mirex. There should be text

12.4. Attachment E: We recommend that a brief discussion of uncertainties be added to this Attachment:

- Step 1 – Home Range Determination - One of the uncertainties with this approach is whether fox will utilize all portions of their estimated home range equally or preferentially utilize certain areas (e.g., less disturbed habitat, along the creek). This should be discussed. Another uncertainty concerns the range of reported fox home ranges. The fox home range used in Appendix E is appropriately the value recommended by Ohio EPA for ecological risk assessments, but a wide range is reported in

the database (USEPA 1993) used by Ohio EPA to calculate the recommended value. The uncertainties associated with variable home range should be discussed.

- Step 2 – The "Allowable Concentration" calculation is based on an assumption that soil mirex concentrations are zero outside of the delineated floodplain. If soil mirex data are available outside of the delineated floodplain, the Allowable Concentration equation should be modified to account for this exposure. If these data are not available, this issue should be discussed under Uncertainty.

12.5. Attachment F: Attached is a revised memo, updating Ohio EPA's position on long-term monitoring of fish in Middle Fork Little Beaver Creek, based on internal discussions with DSW. The Agency also requests that we be informed and have the opportunity to provide oversight and/ or participate in the sampling effort, such that the data obtained can support other programs to document stream conditions.

Table 1. Aquatic life attainment status of the existing aquatic life use designations for the Middle Fork Little Beaver Creek, 1984 - 1999.

RIVER MILE Fish/Macro.	IBI	Mod. Iwb	ICI[a]	QHEI	Use Attainment Status[a]	Comments
Middle Fork Little Beaver Creek (1999)						
			Erie Ontario Lake Plain- WWH Use Designation			
40.3$^{(H)}$/40.3	31*	NA	10*	55.5	**NON**	Georgetown Rd.
38.2$^{(H)}$/38.2	35*	NA	F*	46.0	**NON**	Ust. Salem WWTP-Dst. Buttermilk Creek
37.7$^{(H)}$/37.7	28*	NA	28*	67.5	**NON**	Dst. Salem WWTP-Allen Rd.
36.7$^{(H)}$/36.7	31*	NA	32^{ns}	60.5	PARTIAL	Dst. Nease Chemical-Pine Lake Rd.
33.3$^{(H)}$/33.3	36^{ns}	NA	40	84.0	FULL	Middletown Rd.
32.0$^{(H)}$/32.0	36^{ns}	NA	40	64.0	FULL	New Egypt Swamp
28.8$^{(W)}$/28.8	34^{ns}	5.8*	40	50.0	**NON**	SR 165-New Egypt Swamp
25.8$^{(W)}$/25.8	29*	5.5*	30^{ns}	49.0	**NON**	Rt. 7
23.5$^{(W)}$/23.5	37^{ns}	7.0*	38	59.5	PARTIAL	
21.8$^{(W)}$/21.8	37^{ns}	7.8^{ns}	44	67.5	FULL	Ust. E. Br. Middle Frk.-Lisbon Confield Rd.
20.9$^{(W)}$/20.9	38	7.6^{ns}	26*	48.0	PARTIAL	SR 588-near Franklin Square
15.0$^{(W)}$/15.0	37^{ns}	7.7^{ns}	44	83.5	FULL	Kelch Rd.-Ust. Lisbon
			Erie Ontario Lake Plain- EWH Use Designation			
10.9$^{(W)}$/10.7	49^{ns}	10.0	36*	67.0	PARTIAL	Dst. Lisbon CSOs-US30/SR 45
			Western Allegheny Plateau-EWH Use Designation			
9.9$^{(W)}$/10.0	48^{ns}	10.2	42^{ns}	75.0	FULL	Ust. Perino S&G
9.0$^{(W)}$/9.0^{R}	45*	9.7	40*	71.0	PARTIAL	Ust. Elkton WWTP/dst. Perino S&G-Darner Rd.
8.4$^{(W)}$/8.4	48^{ns}	9.4	50	71.0	FULL	Dst. Elkton WWTP-adj. SR 154
4.4$^{(W)}$/4.4	45*	8.9^{ns}	40*	76.5	PARTIAL	Dst. Pine Run
1.9$^{(W)}$/1.9^{R}	50	9.3^{ns}	42^{ns}	77.5	FULL	Bear Hollow Rd.-At Williamsport
Middle Fork Little Beaver Creek (1987)						
			Erie Ontario Lake Plain- WWH Use Designation			
25.1$^{(W)}$/	22*	4.9*	–	–	(**NON**)	adj. Egypt Rd.
15.1$^{(W)}$/	38	8.0	–	–	(FULL)	Kelch Rd.-Ust. Lisbon
Middle Fork Little Beaver Creek (1985)						
			Erie Ontario Lake Plain- WWH Use Designation			
40.3$^{(H)}$/40.3	37^{ns}	NA	18*	60.0	PARTIAL	Georgetown Rd.
38.3$^{(H)}$/38.3	31*	NA	F*	49.0	**NON**	Ust. Salem WWTP-Dst. Buttermilk Creek
37.6$^{(H)}$/37.7	24*	NA	0*	56.0	**NON**	Dst. Salem WWTP-Allen Rd.
36.7$^{(H)}$/36.7	25*	NA	6*	66.0	**NON**	Dst. Nease Chemical-Pine Lake Rd.
35.4$^{(H)}$/35.4	32*	NA	30^{ns}	69.0	PARTIAL	Goshen Rd.
32.7$^{(H)}$/32.6	25*	NA	38	59.0	**NON**	New Egypt Swamp
– /30.1	–	–	MG	–	(FULL)	US 62
28.8$^{(W)}$/28.8	28*	5.6*	24*	37.0	**NON**	SR 165-New Egypt Swamp
26.8$^{(W)}$/26.9	27*	5.1*	40	42.0	**NON**	Adj. Egypt Rd.-New Egypt Swamp

Table 1. Continued.

RIVER MILE Fish/Macro.	IBI	Mod. Iwb	ICI[a]	QHEI	Use Attainment Status[a]	Comments
			Erie Ontario Lake Plain- WWH Use Designation			
25.1$^{(W)}$/25.1 – /24.8	27* –	4.7* –	18* MG	50.0 –	**NON** (FULL)	Adj. Egypt Rd., Private Drive
21.8$^{(W)}$/21.8	37^{ns}	7.1*	28*	58.0	PARTIAL	Ust. E. Br. Middle Frk.-Lisbon Confield Rd.
20.9$^{(W)}$/20.9	24*	6.3*	38	32.0	**NON**	SR 588-near Franklin Square
15.1$^{(W)}$/15.1	35^{ns}	7.7^{ns}	50	89.0	FULL	Kelch Rd.-Ust. Lisbon
			Erie Ontario Lake Plain- EWH Use Designation			
10.9$^{(W)}$/10.9	43*	8.9^{ns}	40*	74.0	PARTIAL	Dst. Lisbon CSOs-US 30/SR 45
			Western Allegheny Plateau-EWH Use Designation			
9.0$^{(W)}$/9.0^{R}	45*	9.2^{ns}	32*	89.0	PARTIAL	Ust. Elkton WWTP-Darner Rd.
1.9$^{(W)}$/1.9^{R}	48^{ns}	8.7*	46	83.0	PARTIAL	Bear Hollow Rd.-At Williamsport

* -Significant departure from ecoregion biocriterion; poor and very poor results are underlined.

^{ns} -Nonsignificant departure from biocriterion (≤4 IBI or ICI units; ≤0.5 MIwb units).

[a] -Narrative evaluations based upon qualitative samples (VP-very poor, P-poor, F-fair, G-good, VG-very good, and E- exceptional).

Sample Type: H-Headwater station, W-Wading station, B-Boat station.

R -Ecoregional reference station.

Ecoregion Biocriteria:

Erie Ontario Lake Plain (ELOP)

INDEX - Site Type	WWH	EWH	MWH
IBI - wading/headwater	38/40	50	24
MIwb - wading	7.9	9.4	6.2
ICI	34	46	22

Western Allegheny Plateau (WAP)

INDEX - Site Type	WWH	EWH	MWH
IBI - wading/headwater	44/44	50	24
MIwb - wading	8.4	9.4	6.2
ICI	36	46	22

OhioEPA

State of Ohio Environmental Protection Agency

Interoffice Memorandum

To: Mary Logan, U.S. EPA, Region 5

From: Sheila Abraham, DERR, NEDO

Date: January 22, 2008

Subject: NEASE SITE / OPERABLE UNIT 3 (MIDDLE FORK LITTLE BEAVER CREEK): "INDICATOR" FISH SPECIES RECOMMENDATIONS

At the Nease Site operable unit (OU) 3 meeting on September 27, 2006, Dr. John Estenik [Division of Surface Water (DSW)] suggested that rather than analyze all species collected in Middle Fork Little Beaver Creek (MFLBC) to track the long-term efficacy of sediment remediation, we focus on a few species as "indicator" species.

Ohio EPA recognizes that operation and maintenance (O&M) decisions normally occur later in the remedial process. However, given the nexus between the remedial process and other Ohio EPA programs, such as the fish consumption advisories, we believe it may be helpful to provide information to support long-term O&M earlier in the process.

Below is Ohio EPA's recommendation on the timing of the initial monitoring sampling, fish indicator species, and type of analysis, based on the existing biological sampling conducted to date on MFLBC and the Division of Emergency and Remedial Response (DERR) discussions with DSW (including Dave Altfater with the DSW Environmental Assessment Unit) and the Northeast District Office (NEDO) DSW.

This memo updates previous memos on this issue provided to U.S. EPA in October 2006 and October 2007.

1. Timing of the monitoring: The Agency recommends that the long-term monitoring to assess the efficacy of stream remediation activities commence at least 5 years *after* the completion of any MFLBC remediation. Based on past DSW remediation experience, 5 to 8 years is the optimum period for the impacts of remediation to translate into the fish (indicator) species. Also, we recommend that in keeping with Ohio EPA's standard surface water protocol, fish are sampled within the normal sampling window, from June 15 to October 15, unless site-specific circumstances warrant sampling outside this time window.

   The timing of future sampling(s) beyond the initial sampling should be flexible, and determined by the results of the initial sampling.

   The Agency also requests that DERR and DSW be informed of any MFLBC sampling events planned under U.S. EPA's oversight, such that sampling and analysis can be coordinated to support our Agency's programs to assess stream health.

2. Fish species recommended: We recommend analyzing at least 2 species from the 3 species listed below, in the following (hierarchical) order:

   1) common carp; 2) yellow bullhead; and 3) white sucker

   Based on the 2005 sampling, common carp and white sucker are fairly well distributed throughout the stream; yellow bullhead have been found at fewer sampling stations. All species and sizes caught at the different sampling stations during a single sampling effort should be retained until decisions have been made regarding analysis.

   Although literature exists that species' home range(s) may vary, per fishery biologists with DSW (Dave Altfater), these species do not move very much—generally less than 0.4 miles in their lifetime—in a stream habitat such as MFLBC. The data from the different sampling stations should, thus, help make conclusions regarding the pattern of mirex contamination in fish.

3. Fish size to be analyzed:

   3.1. Initial monitoring:
   Ohio EPA recommends that to assess post-remediation sediment mirex concentrations, fish tissue samples are collected no earlier than 5 years after construction completion, using fish that are 3 to 5 years old. To support this effort, below is information on age/length data provided by Dave Altfater (DSW) for the different species.

AGE	SPECIES (Length in mm)		
(Years)	COMMON CARP	YELLOW BULLHEAD	WHITE SUCKER
3	240	185	320
4	350	240	385
5	440	320	430

   3.2. Longer-term monitoring:

   Age/size fish classes analyzed for the long-term monitoring sampling effort will depend, in part, on the results of the initial sampling and remedial goals. Beyond the initial monitoring, Ohio EPA recommends that as a size cut-off, no fish less than the 25th percentile of the length should be analyzed. The Agency recognizes that any determinations on fish sizes to be analyzed will, however, be a function of sizes caught (i.e., if fish below the 25^{th} percentile are the only ones captured, they should be analyzed).

   Also, to support any long-term effort, below are fish size data for the recommended species extracted by Dave Altfater from Ohio EPA's database, focusing on fish collected for tissue analysis in MFLBC, for the stretch of river from the former Nease facility downstream to the Lisbon Dam. Data are also provided on mean and median-sized fish; note that for MFLBC, the mean and median are very close based on the data.

Common Carp: 53 fish used for tissue analysis
25th %tile length = 300 mm (11.8 inches)
50th %tile length = 375 mm (14.8 inches)
Mean length = 373 cm (14.7 inches)

Yellow Bullhead: 13 fish used for tissue analysis
25th %tile length = 200 mm (7.9 inches)
50th %tile length = 209 mm (8.2 inches)
Mean length = 212 mm (8.3 inches)

White Sucker: 168 fish used for tissue analysis
25th %tile length = 260 mm (10.2 inches)
50th %tile length = 287 mm (11.3 inches)
Mean length = 285 mm (11.2 inches)

4. Type of fish tissue analysis: This depends on the remedial objectives and the information necessary to support them.

   - If the intent of the long-term fish monitoring is solely to assess (human) fish consumption, then fish fillet data are adequate.

   - However, if the remedial objective is to reduce mirex concentrations in whole body fish to acceptable levels, so as not to adversely impact populations of aquatic-prey-dependent higher trophic level species, then whole body information may be necessary.

   Note that the remedial objectives should also specify the assessment area or ecological reach for the receptors of concern (i.e., the assessment area within which the remedial goals will have to be met).

   Finally, the chemical analysis should focus on the Nease Site-related chemical of concern, mirex (and photomirex and kepone, as appropriate).